

Copper in the Environment

What is copper?

Copper (Cu) is a pliable, malleable metal, having a bright reddish metallic luster and is an excellent conductor of both electricity and heat. Copper occurs naturally in a wide range of mineral deposits. It is used in making textiles, marine paints, electrical conductors and wires, plumbing fixtures and pipes, as well as coins and cooking utensils. Copper is very toxic to fungi and algae, which is why copper based - compounds are widely used as a wood preservative and fungicide.

Copper is an essential micro-nutrient required in the growth of both plants and animals. In humans, it helps in the production of blood haemoglobin. In plants, copper is especially important in seed production, disease resistance and regulation of water.

How much copper is there in our soil?

Copper is relatively abundant in the earth's crust. The amount of copper present in soil is dependent on the parent rock type, distance from natural ore bodies and/or man-made air emission sources. Most soils have copper in them. MOE soil survey results show that background concentrations of copper in Ontario soils commonly average less than 25 parts per million (ppm), but can contain copper levels as high as 85 ppm.

Is copper harmful to us?

Both humans and animals need some amounts of copper in their diets, but very

high concentrations of copper can be toxic causing adverse effects. The most common symptoms of copper toxicity are injury to red blood cells, injury to lungs, as well as damage to liver and pancreatic functions.

How does exposure to copper occur?

Although humans are exposed to copper from many sources, including drinking water, soil and dust, 75 to 99% of total copper intake is from food (CCME 1997). Each day, people come in contact with items which contain copper (e.g., coins, cooking utensils). The average Canadian ingests about 2 milligrams of copper per day from various sources.

Can one be exposed to copper by eating backyard vegetables?

Copper is naturally present in fruits and vegetables and is necessary for the proper growth and functioning of plants. The primary source is from the soil, but small amounts may result from copper-based fungicides. Although copper concentrations in plants tend to increase with increasing copper concentrations in the soil, soil properties such as the acidity level and organic matter content can affect the amount of copper taken up. Acidification of the soil through the application of certain fertilizers, such as ammonium nitrate or organic materials such as peat moss and pine needles, can increase the uptake of copper into plants. Alternatively, the addition of non-acidic matter (compost or manure) or lime to the soil can reduce the uptake of copper into plants.

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What can people do to reduce exposure to copper?

Exposure to copper contaminated soil is usually not a concern since only a small amount of a person's daily copper intake comes from soils. Although no special measures are needed to reduce exposure, you can take some steps to reduce your family's exposure to copper:

- If children have been outdoors, wash their hands and faces before they eat.
- Cover contaminated soil with clean soil, sod, paving stones or a deck.
- Clean your home with a damp mop/cloth on a regular basis.
- Use removable rugs at entry points and take rugs outside for cleaning to reduce house dust.
- Clean forced air ducts regularly and use quality furnace filters that are changed frequently.
- Clean electrostatic air ducts and furnaces with permanent filters by vacuuming regularly.
- If possible, brush pets outside of the house to reduce dust.
- Thoroughly clean garden vegetables and peel outer skins from root crops, such as carrots.

How can I get more information?

If you suspect your soil is contaminated with copper or other metals, you should contact your local Ministry of the Environment office for more information specific to the area in which you live. The telephone number is listed in the blue pages of your telephone directory.

You can also call the Ministry's Public Information Centre at 1-800-565-4923. Contact your local health unit or talk to your medical doctor if you are concerned with possible exposure to copper or have any questions about health effects.

References

- Guideline for Use at Contaminated Sites in Ontario (revised 1997). Ontario Ministry of the Environment, Queens Park, Toronto, Ontario.
- Canadian Soil Quality Guidelines for Copper: Environmental and Human Health, Canadian Council of Environmental Ministers, Winnipeg, Manitoba, March 1997.
- Nutrition Recommendations - The Report of the Scientific Review Committee - 1990. Supply and Services Canada, Health and Welfare Canada, Ottawa, 1990.

